Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_

**Osmosis Lab**

Ms. Ottolini, AP Biology

**Background Information:**

Osmosis occurs when different concentrations of water are separated by a differentially permeable membrane. One example of a differentially permeable membrane within a living cell is the plasma membrane. This experiment demonstrates osmosis by using dialysis membrane, a differentially permeable cellulose sheet that permits the passage of water but obstructs passage of large molecules (ex: sucrose). If you could examine the membrane with a scanning electron microscope, you would see that it is porous. Thus molecules larger than the pores cannot pass through the membrane. (courtesy of Boston University)

**Your Hypothesis:** Fill in the chart given below with a hypothesis predicting the direction of water movement for each experimental set-up.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Beaker #** | **Solution Inside Bag** | **Solution Outside Bag (in beaker)** | **Predict Mass Change of Bag** (ex: The mass of the bag will increase / decrease because water is moving into/out of the bag because….) | **Draw a Picture** (show the movement of water either into or out of the dialysis bag) |
| 1 | Distilled Water | Distilled Water |  |  |
| 2 | 15% Sucrose Solution | Distilled Water |  |  |
| 3 | 30% Sucrose Solution | Distilled Water |  |  |
| 4 | Distilled Water | 30% Sucrose Solution |  |  |

**Materials:**

-4 x 15 cm lengths of dialysis tubing, soaking in dH2O

-8 x 10 cm pieces of string

-4 x 400 mL beakers (labeled 1-4)

**Procedure – *Note: To save time, your group will be assigned two of the four bags.***

1. Obtain four sections of dialysis tubing, each 15 cm long, which have been presoaked in distilled water. Recall that the dialysis tubing is permeable to water molecules but not to sucrose.
2. Fold over one end of each tube and tie it tightly with string.
3. Attach a string tag to the tied end of each bag and number them form 1 through 4.
4. Slip the open end of the bag over the stem of a funnel. Using a graduate cylinder to measure volume, fill the bags as follows:

Bag 1. 10mL of distilled water

Bag 2. 10mL of 15% sucrose

Bag 3. 10mL of 30% sucrose

Bag 4. 10mL of distilled water

1. As each bag is filled, force out excess air by squeezing the bottom end of the tube. Be sure to do this or the bag will float in the beaker solution!
2. Fold the end of the bag and tie it securely with another piece of string.
3. Rinse each filled bag in the dishpan containing distilled water (dH2O); gently blot off the excess water with paper towel.
4. Weigh each bag to the nearest 0.5 g.
5. Record the weights in the column marked “0 min” on the table provided.
6. Number four 400mL beakers with a china marker.
7. Add 200 mL of dH2O to beakers 1 through 3.
8. Add 200 mL of 30% sucrose solution to beaker 4.
9. Place bags 1 through 3 in the correspondingly numbered beakers.
10. Place bag 4 in the beaker containing 30% sucrose.
11. After 20 minutes, remove each bag form its beaker, blot off the excess fluid, and weigh each bag.
12. Record the weight of each bag on the table provided.
13. Return the bags to their respective beakers immediately after weighing.
14. Repeat steps 15 to 17 at 40 minutes from time zero.
15. At the end of the experiment, take the bags to the sink, cut them open, pour the contents down the drain and discard the bags in the wastebasket. Pour the contents of the beakers down the drain and wash them according to the instructions given by your teacher.

**Methods Summary Chart:**

|  |  |
| --- | --- |
| Independent Variable |  |
| Levels of the Independent Variable (if applicable) |  |
| Dependent Variable |  |
| Method for Measuring Changes in the Dependent Variable |  |
| Control Group (if applicable) |  |
| Constants (factors that stay the same between your control group and your experimental groups) |  |
| Number of Trials |  |

**Data Tables (Individual Lab Group)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Bag/Beaker Contents | Bag Weight (g)  0 Min | Bag Weight (g)  20 Min | Bag Weight (g)  40 Min | Weight change from 0-40 mins (g) |
| 1 | Distilled water/  Distilled water |  |  |  |  |
| 2 | 15% Sucrose/  Distilled water |  |  |  |  |
| 3 | 30% Sucrose/Distilled water |  |  |  |  |
| 4 | Distilled water/  30% Sucrose |  |  |  |  |

**Data Tables (Class Averages)**

|  |  |  |
| --- | --- | --- |
| No. | Bag/Beaker Contents | Weight change  (g) |
| 1 | Distilled water/  Distilled water |  |
| 2 | 15% Sucrose/  Distilled water |  |
| 3 | 30% Sucrose/Distilled water |  |
| 4 | Distilled water/  30% Sucrose |  |

**Discussion / Conclusion:**

Break your discussion / conclusion paragraph down into four parts for the four different beakers. For each beaker, state whether the class average supported or refuted the original hypothesis. Provide the actual numerical value for class average mass change and restate your original hypothesis. Directly connect the data to the hypothesis, and discuss why water moved the way it did based on what you know about osmosis. Your discussion / conclusion paragraph will be graded using the following rubric.

Beaker 1:

-State the class average and whether this average supports or refutes the original hypothesis. (1 point)

-Explain HOW the data supports or refutes the hypothesis. (1 point)

-Discuss why water moved the way it did based on what you know about osmosis. (1 point)

Beaker 2:

-State the class average and whether this average supports or refutes the original hypothesis. (1 point)

-Explain HOW the data supports or refutes the hypothesis. (1 point)

-Discuss why water moved the way it did based on what you know about osmosis. (1 point)

Beaker 3:

-State the class average and whether this average supports or refutes the original hypothesis. (1 point)

-Explain HOW the data supports or refutes the hypothesis. (1 point)

-Discuss why water moved the way it did based on what you know about osmosis. (1 point)

Beaker 4:

-State the class average and whether this average supports or refutes the original hypothesis. (1 point)

-Explain HOW the data supports or refutes the hypothesis. (1 point)

-Discuss why water moved the way it did based on what you know about osmosis. (1 point)

**Total Points: \_\_\_\_\_ / 12**